

MONKEY SPRING FLOW MONITORING QUARTERLY REPORT (Q2 2017)

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I. INTRODUCTION

Hudbay purchased the Sonoita Creek Ranch property in support of natural resources mitigation for the impacts anticipated from the Rosemont Copper Project. A significant element of the mitigation plan at Sonoita Creek Ranch is the existing constructed irrigation system which utilizes perennial flows from Monkey Spring, which is located on the property immediately north of Sonoita Creek Ranch. Hudbay contracted WestLand Resources, Inc. (WestLand) to design and install a flow monitoring station within the irrigation canal upstream of the two onsite ponds to ascertain the volume and regularity of flow reporting to the Sonoita Creek Ranch irrigation system. The flume installation was completed on April 30, 2015. This report contains the data collected for the months of April through June 2017.

2. SITE DESCRIPTION

The property is located in eastern Santa Cruz County between the towns of Sonoita and Patagonia. Sonoita Creek Ranch is located east of State Road (SR) 82, approximately 6 miles south of Sonoita. The primary water source, Monkey Spring, is located on a neighboring property. The released flow from the neighboring property flows into a partially lined irrigation channel running from north to south on the Sonoita Creek Ranch property.

From previous discussions with the neighboring property owner, it was brought to WestLand's attention that an additional water source can contribute flows to the monitored irrigation channel as well. The neighboring property has an irrigation system with flows coming from a separate spring called Cottonwood Spring. The irrigation system includes a ditch which can overflow into the Monkey Spring irrigation ditch. Although reported as a rare occurrence, it is possible that flows from Cottonwood Springs are captured by the flow monitoring station and in the data reported.

3. WATER RIGHTS OVERVIEW

The water rights associated with Monkey Spring are quantified by Certificate of Water Right No. 33-26063.0001 (the Certificate of Water Right). This document represents that Monkey Spring produces 255.793 million gallons (MG) (785 acre-ft) per year for irrigation purposes and approximately 0.657 MG (2.02 acre-ft) per year for stock watering uses. This amounts to a total of 256.45 MG (787.02 acre-ft) per year. According to the "Agreement Regarding Water Rights" signed on June 11, 2012, Sonoita Creek Ranch is entitled to 75 percent of the quantity of water represented by the Certificate of Water Right or such ratable, lesser amount in the event that Monkey Spring produces less water. Given the expected spring production, Sonoita Creek Ranch is expected to receive 192.338 MG (590.27 acre-ft) per year. The adjacent property owner retains rights to all remaining water from Monkey Spring comprising 25 percent of the quantity of water represented by the Certificate of Water Right plus any surplus water actually produced by Monkey Spring. Additionally, the "Agreement Regarding Water Rights" sets a water delivery schedule, as represented

in **Table 1**. Both parties that signed the agreement acknowledged that historically Monkey Spring has produced more water than stated on the Certificate of Water Right, so that compliance with the schedule in **Table 1** effectively meets the 75 percent diversion requirement.

Table 1. Schedule of Monkey Spring Water Delivery

Day	Times for Delivery to Sonoita Creek Ranch	Times for Retention by Adjacent Property Owner
Monday	12:00 am to 1:00 pm (13 hours) 4:00 pm to 12:00 am (8 hours)	1:00 pm to 4:00 pm (3 hours)
Tuesday	12:00 am to 7:00 am (7 hours) 4:00 pm to 12:00 am (8 hours)	7:00 am to 4:00 pm (9 hours)
Wednesday	12:00 am to 7:00 am (7 hours) 4:00 pm to 12:00 am (8 hours)	7:00 am to 4:00 pm (9 hours)
Thursday	12:00 am to 7:00 am (7 hours) 4:00 pm to 12:00 am (8 hours)	7:00 am to 4:00 pm (9 hours)
Friday	12:00 am to 7:00 am (7 hours) 4:00 pm to 12:00 am (8 hours)	7:00 am to 4:00 pm (9 hours)
Saturday	12:00 am to 7:00 am (7 hours) 12:00 pm to 12:00 am (12 hours)	7:00 am to 12:00 pm (5 hours)
Sunday	12:00 am to 12 am (24 hours)	none
Total Hours	124 Hours	44 Hours

4. DATA COLLECTION AND OBSERVATIONS

The data logger at the Monkey Spring flow monitoring station is programmed to take a data point every 15 minutes. Once every three months, this data is downloaded and the flume cleared of any obstructions. **Table 2** provides a summary of the data collected to date.

Table 2. Data Summary

Description	Q2 2017 Data	12-Month Record to Date**	Totals Recorded to Date**
Date Range	April 1 – June 31, 2017	July 1, 2016 – June 31, 2017	April 30, 2015 – June 31, 2017
Duration	3 months	12 months	26 months
Number of Data Points Logged *	8,736	34,926	75,599
Average Flow Recorded	306.6 gpm (1.36 afd)	391.4 gpm (1.73 afd)	386.8 gpm (1.71 afd)
Maximum Flow Recorded	700.7 gpm (3.10 afd)	2,681.0 gpm (11.85 afd)	2,681.0 gpm (11.85 afd)
Minimum Flow Recorded	0 gpm	0 gpm	0 gpm
Cumulative Volume Recorded	40.178 MG (123.30 acre-ft)	205.950 MG (632.04 acre-ft)	441.305 MG (1,354.31 acre-ft)
Cumulative Volume Expected Per Water Rights Agreement	47.914 MG (147.04 acre-ft)	192.184 MG (589.79 acre-ft)	417.275 MG (1,280.57 acre-ft)
Volume Difference Between Expected and Recorded	-7.737 MG (23.74 acre-ft)	+13.766 MG (42.25 acre-ft)	+24.030 MG (73.74 acre-ft)

Gallons per minute (gpm); Acre-ft per day (afd)

* Excludes data points removed from the set due to unrealistic flow readings as discussed below.

** The flow totals recorded in the Q2 2016 report had a spreadsheet error which has been corrected. The totals in this report capture the correction.

The data in **Exhibit 1** is presented as flow over time and cumulative flow over time during the current data period (Q2 2017). The vertical gridlines on these graphs occur at midnight of each day. For this data period, oscillations in flow data ranging between 0 gpm and 600 gpm were observed throughout the quarter. Much of the flow patterns are the same as previously recorded, with the neighboring property regularly diverting flow primarily during week days.

According to Certificate of Water Right No. 33-26063.0001, Monkey Spring produces an average of at least 487.6 gpm (equivalent to 787.02 ac-ft per year). Sonoita Creek Ranch is entitled to 75 percent of this quantity, equivalent to 365.7 gpm. Using this entitlement as the expected average flow at the monitoring station, the cumulative volume expected over the analyzed period (Q2 2017) is 47.914 MG (147.04 acre-ft). The cumulative volume recorded over the period was 40.178 MG (123.30 acre-ft), resulting in a deficiency of 7.737 MG (23.74 acre-ft). This comparison is represented graphically over time in the lower graph of **Exhibit 1**.

5. CONCLUSIONS

The data collected for Q2 of 2017 demonstrated boundaries, trends, and seasonal fluctuations for the flow seen at the Monkey Spring monitoring station. Some conclusions that can be drawn include:

- Monkey Spring continues to produce a maximum of approximately 600 gpm of flow (as reported at Sonoita Creek Ranch). As expected, this is higher than the Certificate of Water Right allocation of 487.6 gpm.

- During Q2, slightly less than the expected volume of flow based on the Certificate of Water Right was reported. A total deficiency of 7.737 MG (23.74 acre-ft) occurred because of regular diversion of flow by the neighboring property. Over the 26 months of data collection, this is only the third period to record a deficiency of cumulative volume in comparison to the expected per the Water Right. Diversions by the neighboring property greater than expected have only been recorded during either Q2 or Q3, which correlates with the typical growing season for the area.
- Throughout Q2 of 2017, the neighboring property regularly diverted flows. Seasonal variations in the water delivery schedule have been noticed in nearly all of the flow monitoring data collected so far. Higher flow diversion by the neighboring property may be due to Q2 being the driest part of the year and the early part of the growing season. The previously recorded flow monitoring data for Q2 of 2015 and 2016 also showed more consistent diversion patterns in comparison to other times of year.
- During the 12-month record to date (July 1, 2016 to June 31, 2017), more than the expected volume of flow based on the Certificate of Water Right was reported. The cumulative volume recorded was 205.950 MG (589.79 acre-ft) which is 13.766 MG (42.25 acre-ft) more than the expected volume of 192.184 MG (589.79 acre-ft).

The flow meter continues to function adequately.

EXHIBIT I

